

Appeal Brief

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re patent application of:

Paul A. Manfredi

Atty. Docket No.: BUR920030054US1

Serial No.: 10/709,575

Group Art Unit: 1792

Filed: May 14, 2007

Examiner: Watson, Joy L.

For: PERMEABLE MEMBRANE CLEAN STATION

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Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

**APPELLANTS' APPEAL BRIEF**

Sirs:

Appellant respectfully appeals the final rejection of claims 8, 11-14, 21, and 26, in the Office Action dated July 15, 2008. A Notice of Appeal was timely filed on October 8, 2008.

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### **I. REAL PARTY IN INTEREST**

The real party in interest is International Business Machines Corporation, Armonk, New York, assignee of 100% interest of the above-referenced patent application.

### **II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

### **III. STATUS OF CLAIMS**

Claims 8, 11-14, 21, and 26 are all the claims pending in the application and are under appeal. Claims 8, 11-14, 21, and 26 stand rejected on prior art grounds under 35 U.S.C. §103(a). Claims 21 and 26 further stand rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. Claims 1-7, 9-10, 15-20, and 22-25 were previously cancelled. None of the claims are allowed; all of the rejections are appealed.

### **IV. STATUS OF AMENDMENTS**

In response to the Office Action mailed July 15, 2008 (referred to herein as the "Office Action"), Appellants filed an after-final Amendment on September 10, 2008. In an Advisory Action dated September 23, 2008, the Examiner indicated that the after-final

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Amendment will be entered for purposes of appeal. Specifically, the Examiner indicated that the after-final amendment would be entered upon filing of this Appeal Brief in support of the Notice of Appeal. Therefore, the claims shown in the CLAIMS APPENDIX are shown in their amended form as of the September 10, 2008 Amendment.

### V. SUMMARY OF CLAIMED SUBJECT MATTER

The Summary of the claimed subject matter is shown by the following annotated claims indicating the location where each claimed feature is disclosed in the specification of the present invention (i.e., in U.S. Patent Application Publication, Pub. No. US 2005/0252524 A1 of November 17, 2005, herein after referred to as “the present specification”)

An embodiment of a cleaning apparatus used during the production of semiconductor wafers is set out in **Independent Claim 8** and illustrated in Figure 1 with an exploded view of exemplary components of the apparatus in Figure 3. This cleaning apparatus comprises a holder 11, a shield 12 and a dispenser 13 {see paragraph [0016], Figure 1}. The holder 11 is adapted to hold and rotate a semiconductor wafer 10 {see paragraph [0016], Figure 1}. The annular shield 12 surrounds the semiconductor wafer 10 such that it is rotated within the shield {see paragraph [0017], Figure 1}. The dispenser 13 is positioned to dispense a cleaning fluid on the semiconductor wafer 10 such that, when the semiconductor wafer 10 is rotated within the shield 12 and the cleaning fluid is dispensed, the cleaning fluid and foreign matter particles are ejected from the semiconductor wafer 10 towards the shield 12 {see paragraph [0017], Figure 1}.

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Additionally, in this embodiment, a surface of the shield 12 facing the semiconductor wafer 10 comprises a semi-permeable absorptive material that collects the cleaning fluid and the foreign matter particles to prevent splashing {see paragraphs [00017] and [00018]}. This surface further comprises absorptive fins 30 that provide air and fluid flow control such that the surface of the shield further prevents the cleaning fluid and the foreign matter particles from forming into a mist within the cleaning apparatus and being re-deposited back on the semiconductor wafer {see paragraphs [00017] and [00018], Figure 3}.

An embodiment of a cleaning apparatus used during the production of semiconductor wafers is set out in **Independent Claim 21** and illustrated in Figure 1 with exploded views of exemplary components of the apparatus in Figures 2 and 3. This cleaning apparatus comprises a holder 11, a shield 12, and a dispenser 13 {see paragraph [0016], Figure 1}. The holder 11 is adapted to hold and rotate a substrate 10 {see paragraph [0016], Figure 1}. The annular shield 12 surrounds the substrate 10 such that it is rotated within the shield {see paragraph [0017], Figure 1}. The dispenser 13 is positioned to dispense a fluid on the substrate 10 such that, when the substrate is rotated within the shield 12 and the fluid is dispensed, the fluid and foreign matter particles are ejected from the substrate 10 towards the shield 12 {see paragraph [0017], Figure 1}.

Additionally, this embodiment comprises a disposable liner on the surface of shield 12 facing the substrate 10 {see paragraphs [0017] and [0018], Figures 2-3}. This disposable liner comprises a perforated material having perforations facing the substrate {see paragraph [0017], Figure 2}. The perforated material with the perforations collects

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the fluid and the foreign matter particles to prevent splashing {see paragraphs [0017]-[0018], Figure 2}. The disposable liner further comprises absorptive fins that provide air and fluid flow control such that the disposable liner further prevents the fluid and the foreign matter particles from forming into a mist within the apparatus and being re-deposited back on the substrate {see paragraphs [0017]-[0018], Figure 3}.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review are as follows:

- A. Whether claims 21 and 26 fail to comply with the written description requirement of 35 U.S.C. §112;
- B. Whether claims 8, 11-14, 21, and 26 are unpatentable under 35 U.S.C. §103(a) by Yang, et al. (U.S. Patent No. 5,868,843), hereinafter referred to as Yang, in view of Mahvan, et al. (U.S. Patent No. 5,614,071), hereinafter referred to as Mahvan; and
- C. Whether claim 21 is unpatentable under 35 U.S.C. §103(a) by Yang, in view of Mahvan, and as evidenced by Dictionary.com, hereinafter referred to as Dictionary.

## VII. ARGUMENT

### A. OFFICE ACTION POSTION

(1) **Claims 21 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.**

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Specifically, the Office Action provides as follows: “The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The application does not support that the disposable liner is both perforated and finned based on applicant's specification and figures.”

**(2) Claims 8, 11-14, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (US Patent 5,868,843 known hereafter as '843) and further in view of Mahvan et al. (Us Patent 5,614,071 known hereafter as '071).**

(a) With regard to independent claim 8, the Office Action provides as follows:

'843 teaches a holder (21) for holding a rotating a semiconductor substrate (22) within a shield (27) where the surface of said shield is semi-permeable (31), and a dispenser (24) to dispense solvent (cleaning fluid) on said substrate (12) (col. 2 lines 40-67). It is inherent that when the dispenser dispenses a fluid on said substrate the fluid and foreign matter particles are ejected from said substrate towards said shield ('843, col. 2 lines 18-22). Additionally '843 teaches that the semi-permeable material prevents fluid ejected from the surface of the rotating substrate from forming into a mist and being re-deposited back on said substrate (col. 3 lines 1-8). '843 does teach the surface of said shield facing said semiconductor wafer comprises semi-permeable material (or sponge) having absorptive fins (projections or corrugations) (col. 2 lines 63-65). The sponge will

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inherently collect said fluid and prevents splashing by trapping the particles (col. 3 lines 1-10) '843 does not teach that the shield surrounds the substrate. '843 teaches a vertically orientated fin ('843 col. 2 lines 63-65) as previously discussed. One of ordinary skill in the art knows that a fin (or baffle) and a sponge inherently controls fluid flow. Using the known technique of controlling fluid and air flow with the absorptive fins (or baffles) as taught by '843 would have been obvious to one of ordinary skill in the art. It has been held that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138. At the time of the invention one of ordinary skill in the art would have known that the fluid dispensed on said substrate would splash and bounce back onto the substrate ('843 col. 2 lines 18- 22) and the particles that bounce back are undesirable. '071 teaches shields (Fig. 1 items 26, 28, 30) that surrounds the substrate in order to capture sputtered material and prevent it from being deposited on the substrate (col. 1 lines 60-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the shape of the shield (which completely surrounds the substrate) as taught by '071, in the shield of '843, since a shield which completely surrounds the substrate captures extra material and prevents it from re-depositing on the substrate. It has been held that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138.

(b) With regard to independent claim 21, the Office Action provides no additional support for the rejection.

**(3) Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over '843, and further in view of '071 and as evidenced by Dictionary.com.**

(a) With regard to independent claim 21, the Office Action provides as follows:

'843 teaches a holder (21) for holding a rotating a semiconductor substrate (22), a shield for the substrate (27) where the surface of said shield is semi-permeable (31), and a dispenser (24) to dispense solvent (cleaning fluid) on said substrate (12) (col. 2 lines 40-67). It is inherent that when the dispenser dispenses a fluid on said substrate the fluid and foreign matter particles are ejected from said substrate towards said shield ('843, col. 2 lines 18-22). Additionally '843 teaches that the semi-permeable material prevents fluid ejected from the surface of the rotating substrate from forming into a mist and being re-deposited back on said substrate (col. 3 lines 1-8). Additionally '843 teaches said semi-permeable material made of a sponge material (a protective covering that serves to conceal and is perforated where perforated is defined as pierced with a hole or holes as evidenced by Dictionary.com) and faces said substrate (col. 2 lines 63- 65, Fig. 3). '843 does teach the surface of said shield facing said semiconductor wafer comprises semi-permeable material (or sponge) having absorptive fins (projections or corrugations) (col. 2 lines 63-65). The sponge will inherently collect said fluid and prevents splashing by trapping the particles (col. 3 lines 1-10). '843 does not teach that the shield surrounds the



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substrate. '843 teaches a vertically orientated fin ('843 col. 2 lines 63-65) as previously discussed. One of ordinary skill in the art knows that a fin (or baffle) and a sponge inherently controls fluid flow. Using the known technique of controlling fluid and air flow with the absorptive fins (or baffles) as taught by '843 would have been obvious to one of ordinary skill in the art. It does not explicitly teach that the material is disposable, but it does teach that the semi-permeable material can be removed for maintenance when desired (col. 3 lines 37-39) because the semi-permeable material is capable of being removed it is disposable because it can be throwaway. Additionally '843 teaches the semi-permeable material can be removed; therefore, it is able to be replaced if desired. '843 does not teach that the shield surrounds the substrate. At the time of the invention one of ordinary skill in the art would have known that the fluid dispensed on said substrate would splash and bounce back onto the substrate ('843 col. 2 lines 18-22) and the particles that bounce back are undesirable. '071 teaches shields (Fig. 1 items 26, 28, 30) that surrounds the substrate in order to capture sputtered material and prevent it from being deposited on the substrate (col. 1 lines 60-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the shape of the shield (which completely surrounds the substrate) as taught by '071, in the shield of '843, since a shield which completely surrounds the substrate captures extra material and prevents it from re-depositing on the substrate. It has been held that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138.

**B. APPELLANTS' POSITON**

**(1) Regarding whether claims 21 and 26 should be rejected under 35 U.S.C. 112, first paragraph, for failing to comply with the written description requirement, the position of the Apellants is as follows:**

Claims 21 and 26 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Specifically, the Office Action indicates that the application does not support that the disposable liner is both perforated and finned based on the specification and figures. These rejections are traversed as explained below.

The Appellants submit that there is adequate support in the specification for the position that the disposable liner is both perforated and finned. Paragraph [0017] provides that “The semi-permeable material 20, 30 can be a permanent part of the shield 12 or a disposable material designed to be periodically removed from the shield and replaced.” That is, it provides that in one embodiment the semi-permeable material can comprise a disposable liner.

Paragraph [0017] further provides that the “The semi-permeable material 12 [which can be a disposable material] comprises an absorptive material, a screen material, a perforated material, a finned material, etc.” The use of etc. at the end of the list means that the list is not all encompassing and may include other materials in the same class (e.g., see definition of etcetera in *The American Heritage® Dictionary of the English*

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*Language, Fourth Edition Copyright © 2006 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.*). Furthermore, since no conjunctions (e.g., “and” or “or”) are set out within the listing of potential materials, the list is not limited by any such conjunctions. For example, because the materials listed are not connected by the word “and”, the semi-permeable material 12 is not limited to comprising all of the materials in the list. Similarly, because the materials listed are not connected by the word “or”, the semi-permeable material 12 is not limited to comprising only one of the materials in the list. Consequently, the Appellants submit that the specification does disclose that the disposable liner of semi-permeable material can comprise a combination of any or all of the materials listed in paragraph [0017] and, particularly, as claimed in independent claim 21, can comprise both perforated and finned material.

In response to this argument as presented previously, the Advisory Action dated September 23, 2008 stated “Applicant argues that the list in [0017] provides support for the limitation of claim 21. The argument is unconvincing because the list makes no indication that the alternative listed are intended to be used in combination, and particularly does not suggest the specific combination claimed.” The Appellants respectfully disagree.

Specifically, the Appellants submit that the assumption made that the list is of “alternative” materials is incorrect. Rather, this is a list of any materials alone and/or in combination that can make up the surface of the shield. Specifically, the list of possible semi-permeable materials set out in paragraph [0017] includes “an absorptive material, a

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screen material, a perforated material, a finned material, etc.” One exemplary combination provided is that the shield can comprise both absorptive material and finned material (i.e., “The fins ...can be absorptive.”).

MPEP§2163.02 provides that the standard for determining compliance with the written is, "does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed" (citing *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989). Under *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991)). It further provides that “to satisfy the written description requirement, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, and that the invention, in that context, is whatever is now claimed” (citing *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570, 1575, 227 USPQ 177, 179 (Fed. Cir. 1985) (quoting *In re Kaslow*, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983)). The Appellants submit that, given the non-limiting nature of the list as evidence by the “etc.” at the end of the list and the exemplary combination provided in paragraph [0017], one skilled in the art would understand with reasonable clarity that at time the Appellants filed this application, they were in possession of the invention. That is, one skilled in the art would understand with reasonable clarity that the Appellants anticipated the use of the materials in various combinations to achieve the desired result (i.e., prevention of splashing and mist formation).

In view of the foregoing, the Board is respectfully requested to reconsider and withdraw the rejections.

**(2) Regarding whether claims 8, 11-14, 21, and 26 should be rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (US Patent 5,868,843 known hereafter as '843) and further in view of Mahvan et al. (US Patent 5,614,071 known hereafter as '071), the position of the Appellants is as follows:**

The Appellants further submit that the cited prior art references alone or in combination do not teach or suggest the following features in independent claim 8: (1) “wherein said surface further comprises absorptive fins that provide air and fluid flow control such that said surface of said shield further prevents said cleaning fluid and said foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer.”

More particularly, Yang teaches a detachable sponge device composed of a curved mounting piece and a corrugated piece of sponge attached to the mounting piece to absorb splattered solvent jetted at the wafer’s edge from bouncing back onto the wafer surface (see Abstract). Similarly, the present invention is a cleaning apparatus (e.g., clean station) used during the production of semiconductor wafers. This clean station includes a holder for holding and rotating a semiconductor wafer, a shield surrounding the semiconductor wafer, and a dispenser positioned to dispense a cleaning fluid on the semiconductor wafer. However, the present inventors further identified, in the specification, a problem associated conventional clean stations used to clean the entire surface of the substrate, a problem that goes beyond just the backsplash problem (e.g., as

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considered by Yang) to the problem of mist formation. Thus, in the present invention the shield is configured (e.g., with a semi-permeable material and absorptive fins) in such a way that it prevents splashing and further provides air and fluid flow control to the extent that it prevents the cleaning fluid and the foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer.

More specifically, in rejecting claim 8, the Office Action provides as follows: “’843 does teach the surface of said shield facing said semiconductor wafer comprises semi-permeable material (or sponge) having absorptive fins (projections or corrugations) (col. 2 lines 63-65)”. The Applicants respectfully disagree.

Col. 2, lines 63-65, of Yang discloses “a corrugated piece of absorbent material 31, such as sponge, attached on the curved inner side of the mounting piece 32. The corrugated piece of sponge 31 is substantially equal in length to the mounting piece...” Col. 3, lines 1-8, of Yang discloses that the purpose of this sponge is to “absorb and act as a buffer to any oversprayed particles of the solvent from the wafer 22” and also that “the corrugated surface of the sponge acts as a trapping means to prevent the particles from being directly bounced back therefrom.” No alternative structure other than “corrugated” is disclosed.

The Appellants submit that the “corrugated” surface of the shield of Yang, as disclosed, is not equivalent to the “finned” surface of the shield of the present invention and, thus, this the shield of Yang would not be sufficient to provide both the fluid and air flow control to prevent “said cleaning fluid and said foreign matter particles from

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forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer”, as claimed. More particularly, the Appellants further submit that nothing in the text or illustrations of Yang would teach or suggest that the shield of Yang was structured with fins.

As mentioned above, the surface of the Yang shield is only described as being “corrugated”. The illustration provided in Figure 3 of Yang only shows the field as being corrugated or as having a shallow uniform scalloped shape. The term “corrugated” is generally understood to mean shaped into parallel folds or grooves (e.g., see Dictionary.com Unabridged (v 1.1) Based on the Random House Unabridged Dictionary, © Random House, Inc. 2006.) and the material 31 of Yang is illustrated in Figure 2 as having such parallel grooves. Synonyms for corrugated include, for example, channelled, creased, crinkled, crumpled, flexed, fluted, folded, furrowed, puckered, roughened, rumpled, wrinkled (see Roget’s 21<sup>st</sup> Century Thesaurus, Third Edition ©2008 by the Philip Lief Group). Finned is not a synonym for corrugated.

In the context of the present invention, the term “fins” should be understood by one skilled in the art, based on the text and illustrations, to mean “something resembling a fin in shape or function, as: ... A projecting vane used for cooling, as on a radiator or an engine cylinder” (see, for example, The American Heritage® Dictionary of the English Language, Fourth Edition. Houghton Mifflin Company, 2004. 10 Sep. 2008, which further defines “vane” as “Any of several usually relatively thin, rigid, flat, or sometimes curved surfaces radially mounted along an axis, as a blade in a turbine or a sail on a windmill, that is turned by or used to turn a fluid.”). Synonyms for fin include,

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for example, airfoil, stabilizer and vane (see Synonym Collection v1.1 ©2008 by Dictionary.com, LLC). Corrugation is not a synonym for fin.

The Applicants submit that it is these fin-shaped structures (e.g., blade-like structures with relatively thin, rigid, surfaces) that provide the fluid and air flow control necessary to prevent the cleaning fluid and the foreign matter particles from forming into a mist within the cleaning apparatus and being re-deposited back on said semiconductor wafer. One skilled in the art would recognize that a corrugated (i.e., grooved) surface such as that disclosed in Yang would provide a greater surface area to trap splashed particles in order to prevent the particles from being directly bounced back onto the wafer, but that such corrugations would not be suitable, nor are they disclosed as being suitable, for fluid and air flow control that would prevent the claimed mist formation.

In response to the Appellants arguments, as previously presented, the Office Action reiterated the position that the corrugations are the equivalent of fins (at paragraph 3.d) and further provided (at paragraph 3.f.) as follows: “By Applicants definitions the term corrugated states that a corrugated material has grooves and implicitly states that there are ridges. Applicant then states that the term “fin” is a fixed structure projecting outward” (i.e., has ridges and grooves), thus the two materials are equivalent according to the claims and the applicant’s definitions.” The Appellants respectfully disagree and submit that the argument present by the Examiner supporting a finding that corrugated material and finned material are equivalent is invalid.

Specifically, in order to establish equivalence the Examiner: (1) implied from the definition of corrugated the feature of ridges; (2) implied from the definition of fins the



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features of both grooves and ridges; and (3) concluded equivalence based on a finding that the two terms. This argument is invalid for a number of reasons.

A “ridge” is generally defined as “a long, narrow upper section or crest” and a “groove” is generally defined as “a long narrow furrow or channel” (see The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2006 by Houghton Mifflin Company. Published by Houghton Mifflin Company). One does not imply the other, as structure can have grooves without ridges and vice versa. That is, simply because the shield of Yang is corrugated (i.e., has parallel grooves) does not mean that also has ridges. As illustrated, in Figure 3, the corrugated shield of Yang has a uniform shallow scallop shape without clear “ridges”. Furthermore, the fact that something is “a fixed structure projecting outward” does not imply grooves. That is, a structure, including a finned structure, can be fixed and project outward in the absence of in the absence of grooves (i.e., without creating a long narrow furrow or channel). Finally, even if it could be implied that the same features of “ridges and grooves” are found in both corrugations and fins, clearly two items can have some of the same features but not amount to the same structure (e.g., a table and a chair may both have four legs connected to a flat surface, but they are still not the same structure).

As discussed above, in the context of the present invention, fins are generally understood to mean projections that resemble fins (e.g., blade-like structures with relatively thin, rigid, surfaces). Whereas, the surface of the shield in Yang is described as corrugated (col. 2, lines 63-65) and clearly illustrated (see Figure 3) as having a uniform shallow scalloped shape. Therefore, the Appellants submit that the “corrugated” surface

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of the shield of Yang, as disclosed, is not equivalent to the “finned” surface of the shield of the present invention and, thus, this the shield of Yang would not be sufficient to provide both the fluid and air flow control to prevent “said cleaning fluid and said foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer”, as claimed. .

Additionally, the Office Action (at paragraph 3.d.) further cited Mahvan as “teaching shields (Fig. 1 item 26, 28 and 30) that surrounds the substrate in order to capture sputtered materials (reads on mist) and prevent it from being deposited on the substrate (col. 2, lines 60-65). The Appellants respectfully disagree.

Mahvan teaches a shield for use in a sputtering system that deposits ejected atoms of a material, such as carbon, onto a fixed substrate. During a wide-angle sputtering deposition process (e.g., a carbon deposition process), over-sprayed atoms (i.e., atoms that miss the target) are deposited onto the shield (see col. 1, lines 30-38). In other words the shield of Mahvan does not capture spray that splashes off a rotating target, as in Yang or in the present invention, rather it simply captures deposited material that misses the target. Furthermore, the shield structure of Mahvan is specifically designed with cavities (illustrated as indentions) to hold the deposited material in a way that minimizes flaking due to shield buckling. The cited portion of Mahvan (i.e., col. 2, lines 60-65) refers to the sputtering gun used for the deposition process and the shield members. Those skilled in the art will recognize that “sputtering” is a process by which atoms are thinly deposited on a surface. Nothing in the cited portion of Mahvan or anywhere else in Mahvan “reads on mist”, much less discloses a shield surface structure (e.g., like the fins of the present

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invention) that would provide for both fluid and air flow control that would prevent cleaning fluid and foreign matter particles from forming into a mist and being re-deposited back on the semiconductor wafer.

Therefore, the Appellants submit that independent claim 8 is patentable over the cited prior art references. Further, dependent claims 11-14 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view of the foregoing the Board is respectfully requested to reconsider and withdraw these rejections.

**(3) Regarding whether claims 21 and 26 should be rejected under 35 U.S.C. 103(a) as being unpatentable over '843, and further in view of '071 and as evidenced by Dictionary.com, the position of the Appellants is as follows:**

For the same reasons as set out above in response to the rejection of independent claim 8, the Appellants submit that the cited prior art references do not teach or suggest the feature in independent claim 21 of “wherein said disposable liner further comprises absorptive fins that provide air and fluid flow control such that said disposable liner further prevents said fluid and said foreign matter particles from forming into a mist within said apparatus and being re-deposited back on said substrate”. The Appellants further submit that the cited prior art references also do not teach or suggest the following additional feature in independent claim 21: “wherein said disposable liner comprises a perforated material having perforations facing said substrate, said perforated material

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with said perforations collects said fluid and said foreign matter particles to prevent splashing”.

More particularly, Yang teaches a detachable sponge device composed of a curved mounting piece and a corrugated piece of sponge attached to the mounting piece to absorb splattered solvent jetted at the wafer’s edge from bouncing back onto the wafer surface (see Abstract). Similarly, the present invention is a cleaning apparatus (e.g., clean station) used during the production of semiconductor wafers. This clean station includes a holder for holding and rotating a semiconductor wafer, a shield surrounding the semiconductor wafer, and a dispenser positioned to dispense a cleaning fluid on the semiconductor wafer. However, the present inventors further identified, in the specification, a problem associated conventional clean stations used to clean the entire surface of the substrate, a problem that goes beyond just the backsplash problem (e.g., as considered by Yang) to the problem of mist formation. Thus, in the present invention the shield is configured (e.g., with a semi-permeable material with perforations and absorptive fins) in such a way that it prevents splashing and further provides air and fluid flow control to the extent that it prevents the cleaning fluid and the foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer.

More specifically, in rejecting claim 21, the Office Action provides as follows: “’843 does teach the surface of said shield facing said semiconductor wafer comprises semi-permeable material (or sponge) having absorptive fins (projections or corrugations) (col. 2 lines 63-65)”. The Applicants respectfully disagree.

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Col. 2, lines 63-65, of Yang discloses “a corrugated piece of absorbent material 31, such as sponge, attached on the curved inner side of the mounting piece 32. The corrugated piece of sponge 31 is substantially equal in length to the mounting piece...”

Col. 3, lines 1-8, of Yang discloses that the purpose of this sponge is to “absorb and act as a buffer to any oversprayed particles of the solvent from the wafer 22” and also that “the corrugated surface of the sponge acts as a trapping means to prevent the particles from being directly bounced back therefrom.” No alternative structure other than “corrugated” is disclosed.

The Appellants submit that the “corrugated” surface of the shield of Yang, as disclosed, is not equivalent to the “finned” surface of the shield of the present invention and, thus, this the shield of Yang would not be sufficient to provide both the fluid and air flow control to prevent “said cleaning fluid and said foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer”, as claimed. More particularly, the Appellants further submit that nothing in the text or illustrations of Yang would teach or suggest that the shield of Yang was structured with fins.

As mentioned above, the surface of the Yang shield is only described as being “corrugated”. The illustration provided in Figure 3 of Yang only shows the field as being corrugated or as having a shallow uniform scalloped shape. The term “corrugated” is generally understood to mean shaped into parallel folds or grooves (e.g., see Dictionary.com Unabridged (v 1.1) Based on the Random House Unabridged Dictionary, © Random House, Inc. 2006.) and the material 31 of Yang is illustrated in Figure 2 as

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having such parallel grooves. Synonyms for corrugated include, for example, channelled, creased, crinkled, crumpled, flexed, fluted, folded, furrowed, puckered, roughened, rumpled, wrinkled (see Roget's 21<sup>st</sup> Century Thesaurus, Third Edition ©2008 by the Philip Lief Group). Finned is not a synonym for corrugated.

In the context of the present invention, the term “fins” should be understood by one skilled in the art, based on the text and illustrations, to mean “something resembling a fin in shape or function, as: ... A projecting vane used for cooling, as on a radiator or an engine cylinder” (see, for example, The American Heritage® Dictionary of the English Language, Fourth Edition. Houghton Mifflin Company, 2004. 10 Sep. 2008, which further defines “vane” as “Any of several usually relatively thin, rigid, flat, or sometimes curved surfaces radially mounted along an axis, as a blade in a turbine or a sail on a windmill, that is turned by or used to turn a fluid.”). Synonyms for fin include, for example, airfoil, stabilizer and vane (see Synonym Collection v1.1 ©2008 by Dictionary.com, LLC). Corrugation is not a synonym for fin.

The Applicants submit that it is these fin-shaped structures (e.g., blade-like structures with relatively thin, rigid, surfaces) that provide the fluid and air flow control necessary to prevent the cleaning fluid and the foreign matter particles from forming into a mist within the cleaning apparatus and being re-deposited back on said semiconductor wafer. One skilled in the art would recognize that a corrugated (i.e., grooved) surface such as that disclosed in Yang would provide a greater surface area to trap splashed particles in order to prevent the particles from being directly bounced back onto the

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wafer, but that such corrugations would not be suitable, nor are they disclosed as being suitable, for fluid and air flow control that would prevent the claimed mist formation.

In response to the Appellants arguments, as previously presented, the Office Action reiterated the position that the corrugations are the equivalent of fins (at paragraph 3.d) and further provided (at paragraph 3.f.) as follows: “By Applicants definitions the term corrugated states that a corrugated material has grooves and implicitly states that there are ridges. Applicant then states that the term “fin” is a fixed structure projecting outward” (i.e., has ridges and grooves), thus the two materials are equivalent according to the claims and the applicant’s definitions.” The Appellants respectfully disagree and submit that the argument present by the Examiner supporting a finding that corrugated material and finned material are equivalent is invalid.

Specifically, in order to establish equivalence the Examiner: (1) implied from the definition of corrugated the feature of ridges; (2) implied from the definition of fins the features of both grooves and ridges; and (3) concluded equivalence based on a finding that the two terms. This argument is invalid for a number of reasons.

A “ridge” is generally defined as “a long, narrow upper section or crest” and a “groove” is generally defined as “a long narrow furrow or channel” (see The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2006 by Houghton Mifflin Company. Published by Houghton Mifflin Company). One does not imply the other, as structure can have grooves without ridges and vice versa. That is, simply because the shield of Yang is corrugated (i.e., has parallel grooves) does not mean that also has ridges. As illustrated, in Figure 3, the corrugated shield of Yang has a

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uniform shallow scallop shape without clear “ridges”. Furthermore, the fact that something is “a fixed structure projecting outward” does not imply grooves. That is, a structure, including a finned structure, can be fixed and project outward in the absence of in the absence of grooves (i.e., without creating a long narrow furrow or channel). Finally, even if it could be implied that the same features of “ridges and grooves” are found in both corrugations and fins, clearly two items can have some of the same features but not amount to the same structure (e.g., a table and a chair may both have four legs connected to a flat surface, but they are still not the same structure).

As discussed above, in the context of the present invention, fins are generally understood to mean projections that resemble fins (e.g., blade-like structures with relatively thin, rigid, surfaces). Whereas, the surface of the shield in Yang is described as corrugated (col. 2, lines 63-65) and clearly illustrated (see Figure 3) as having a uniform shallow scalloped shape. Therefore, the Appellants submit that the “corrugated” surface of the shield of Yang, as disclosed, is not equivalent to the “finned” surface of the shield of the present invention and, thus, this the shield of Yang would not be sufficient to provide both the fluid and air flow control to prevent “said cleaning fluid and said foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer”, as claimed. .

Additionally, the Office Action (at paragraph 3.d.) further cited Mahvan as “teaching shields (Fig. 1 item 26, 28 and 30) that surrounds the substrate in order to capture sputtered materials (reads on mist) and prevent it from being deposited on the substrate (col. 2, lines 60-65). The Appellants respectfully disagree.



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Mahvan teaches a shield for use in a sputtering system that deposits ejected atoms of a material, such as carbon, onto a fixed substrate. During a wide-angle sputtering deposition process (e.g., a carbon deposition process), over-sprayed atoms (i.e., atoms that miss the target) are deposited onto the shield (see col. 1, lines 30-38). In other words the shield of Mahvan does not capture spray that splashes off a rotating target, as in Yang or in the present invention, rather it simply captures deposited material that misses the target. Furthermore, the shield structure of Mahvan is specifically designed with cavities (illustrated as indentions) to hold the deposited material in a way that minimizes flaking due to shield buckling. The cited portion of Mahvan (i.e., col. 2, lines 60-65) refers to the sputtering gun used for the deposition process and the shield members. Those skilled in the art will recognize that “sputtering” is a process by which atoms are thinly deposited on a surface. Nothing in the cited portion of Mahvan or anywhere else in Mahvan “reads on mist”, much less discloses a shield surface structure (e.g., like the fins of the present invention) that would provide for both fluid and air flow control that would prevent cleaning fluid and foreign matter particles from forming into a mist and being re-deposited back on the semiconductor wafer.

Finally, in rejecting claim 21, the Office Action, referring to Yang, provides:

“Additionally '843 teaches said semi-permeable material made of a sponge material (a protective covering that serves to conceal and is perforated where perforated is defined as pierced with a hole or holes as evidenced by Dictionary.com) and faces said substrate (col. 2 lines 63- 65, Fig. 3). '843 does teach the surface of said shield facing said semiconductor wafer comprises semi-permeable material (or sponge) having absorptive fins (projections or corrugations) (col. 2 lines 63-65).”

The Appellants respectfully disagree.

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Independent claim 21 includes the additional limitations of a disposable liner comprises a perforated material having perforations facing the substrate. Specifically, as described in paragraphs [0016]-[0017] of the specification, the present invention comprises a shield and the surface of the shield can comprise a permanent or disposable semi-permeable material, which in turn can comprise, for example, an absorptive material, a screen material, a perforated material etc. Figure 2 illustrates such perforations. Neither Yang nor Mahvan teach such a perforated material lining the shield with perforations actually facing the substrate. Perforations are generally understood to mean holes punched or bored through something (see The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2006 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved). Again, Yang teaches an absorbent material or sponge, not a material with perforations (i.e., not a material with holes punched or bored through it). Similarly, Mahvan teaches an array of cavities (illustrated as indentions) on a wall surface, not a material with perforations (i.e., not a material with holes punched or bored through it).

Therefore, the Appellants submit that independent claim 21 is patentable over the cited prior art references. Further, dependent claim 26 is similarly patentable, not only by virtue of its dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view of the foregoing the Board is respectfully requested to reconsider and withdraw these rejections.

## VII. CONCLUSION

In view the forgoing, the Board is respectfully requested to reconsider and withdraw the rejections of claims 8, 11-14, 21, and 26.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

Date: December 5, 2008

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**IX. CLAIMS APPENDIX**

1-7 (Cancelled).

8. A cleaning apparatus used during the production of semiconductor wafers, said apparatus comprising:

a holder adapted to hold and rotate a semiconductor wafer;

an annular shield surrounding said semiconductor wafer such that said substrate is rotated within said shield; and

a dispenser positioned to dispense a cleaning fluid on said semiconductor wafer - such that, when said semiconductor wafer is rotated within said shield and said cleaning fluid is dispensed, said cleaning fluid and foreign matter particles are ejected from said semiconductor wafer towards said shield,

wherein a surface of said shield facing said semiconductor wafer comprises a semi-permeable absorptive material that collects said cleaning fluid and said foreign matter particles to prevent splashing and

wherein said surface further comprises absorptive fins that provide air and fluid flow control such that said surface of said shield further prevents said cleaning fluid and said foreign matter particles from forming into a mist within said cleaning apparatus and being re-deposited back on said semiconductor wafer.

9-10. (Canceled).

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11. The apparatus in claim 8, wherein said semi-permeable material comprises one of an absorptive material, a screen material, and a perforated material.

12. The apparatus in claim 8, wherein said semi-permeable material comprises a disposable material and is adapted to be periodically removed from said shield and replaced.

13. The apparatus in claim 8, wherein said semi-permeable material comprises a permanent part of said shield.

14. The apparatus in claim 8, wherein cleaning fluid ejected from the surface of the rotating semiconductor wafer is collected by and drains down said semi-permeable material.

15-20. (Canceled).

21. An apparatus comprising:

a holder adapted to hold and rotate a substrate;

an annular shield surrounding said substrate such that said substrate is rotated within said shield;

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a dispenser positioned to dispense a fluid on said substrate such that, when said substrate is rotated within said shield and said fluid is dispensed, said fluid and foreign matter particles are ejected from said substrate towards said shield; and

a disposable liner on a surface of said shield facing said substrate,

wherein said disposable liner comprises a perforated material having perforations facing said substrate, said perforated material with said perforations collects said fluid and said foreign matter particles to prevent splashing, and

wherein said disposable liner further comprises absorptive fins that provide air and fluid flow control such that said disposable liner further prevents said fluid and said foreign matter particles from forming into a mist within said apparatus and being re-deposited back on said substrate.

22-25. (Canceled).

26. The apparatus in claim 21, wherein said disposable liner is further adapted to drain said fluid and said foreign matter particles ejected from said substrate.

**X. EVIDENCE APPENDIX**

There is no other evidence known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

**XI. RELATED PROCEEDINGS APPENDIX**

There is no other related proceedings known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.